# A New Freshwater Clingfish (Pisces: Gobiesocidae) from Baja California Sur, México

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*Abstract.*—A new species of freshwater clingfish is described. The species differs from other known freshwater species of the genus *Gobiesox* by its morphometrics, morphology, tongue position, insertion and number of teeth and by the closer position of the anus to the anal fin. This is the seventh known freshwater species of clingfish of the genus in North America, the first in the Nearctic and the second endemic freshwater fish from the Peninsula of Baja California.

*Resumen.*—Se describe una nueva especie de pez "cucharita" de agua dulce. La especie se diferencia de otras especies dulceacuícolas del género *Gobiesox* por sus medidas morfométricas, morfología, posición de la lengua, la inserción y número de dientes y por la posición del ano más cercano a la aleta anal. Esta es la séptima especie conocida del género en aguas dulces en Norteamérica, la primera en la región neártica y la segunda especie endémica de la península de Baja California.

The family Gobiesocidae has a large geographic distribution and is composed of eight subfamilies (Briggs 1993). One subfamily, Gobiesocinae, includes nine genera and ca. 60 species distributed almost exclusively in tropical and subtropical waters of America (Briggs 1955). The most diverse genus in the subfamily is *Gobiesox* Lacepède, which contains a great proportion of species inhabiting rocky or coralline habitats in the neritic zone. There are some exclusively freshwater species that may be classified as the vicarious or complementary component of Myers (1963). These include the Western American species *G. potamius* Briggs, *G. juradoensis* Fowler, *G. fulvus* Meek, *G. mexicanus* Briggs and Miller, *G. fluviatilis* Briggs and Miller, the new species described here, and the Eastern North American *G. nudus* (Linnaeus).

In Mexican freshwater, two species, *G. fluviatilis* and *G. mexicanus*, have been reported (Briggs and Miller 1960; Burr and Buth 1977; Espinosa Pérez et al. 1988). Two other species, *G. strumosus* Cope and *G. adustus* Jordan and Gilbert, have been collected in brackish water in the estuaries of Río Tuxpan, Veracruz, and coastal lagoons and tidal flats of Sonora, Sinaloa, and Nayarit (Castro-Aguirre 1978).

The specimens that are the basis for the description of the new species were collected during a biological field trip near the southern portion of the Sierra de la Giganta, Baja California Sur, close to the town of Pocitas (approx. 100 km north of La Paz). This finding is biogeographically interesting, and provides ev-

idence for potential speciation patterns in the genus. In particular, it offers some clues to the origin and adaptation of the freshwater fish fauna of Baja California Peninsula, which has a very low diversity (Follett 1961). *Fundulus lima* Vaillant and the new gobiesocid are the only reported endemic freshwater fishes to Baja California.

## **METHODS**

Counts and measurements follow Briggs (1955) and Briggs and Miller (1960). Measurements were made using dial calipers and presented as thousandths of standard length (SL). IBUNAM-P is the abbreviation of the Instituto de Biologia, UNAM fish collection, formerly UNAM in Leviton et al. (1985).

### RESULTS

# Gobiesox juniperoserrai n. sp. (Fig. 1).

*Holotype.*—IBUNAM-P 7606, male 105.2 mm SL, Las Pocitas (Poza del Vado), Baja California Sur, México, collected by Paulino Pérez and party, 12 May 1986.

*Paratypes.*—IBUNAM-P 7607 (2) collected with the holotype, which are cleared and stained (67.4–98.2 mm SL).

*Diagnosis.*—A *Gobiesox* with poor development of head papillae and smooth margin of upper lip. Lower jaw without accessory incisor-like teeth and two rows of flat incisor-like teeth. Tongue completely adhered to mouth floor. Origin of dorsal fin closer to base of caudal fin than to upper part of base of pectoral fin. Anus much closer to base of anal fin than to pelvic disc margin. The three specimens have head contained 2.2–2.7 times in SL, and 27 vertebrae. Each part of region C of the disc has 5–6 longitudinal rows of papillae and 7–8 rows cross with region A of the disc. Dorsal fin rays 13 (13–14), anal fin rays 7 (7–8), pectorals fin rays 22 (22–24), and caudal fin rays 13 (13–14).

Description.—Depressed body, depth 5.3–5.6 in standard length; short caudal peduncle, least depth 0.6–0.7 in its length. Head very broad, width 2.2–2.7 and length 2.3–2.6 in SL. Eye 2.5–3.2 in bony interorbital space, and 6.7–7.7 in head length. Short and rounded snout, 2.9-3.2 in head length. Posterior nostril tubular, located at anterior edge of eye; anterior nostril tubular, provided with bilobed dermal flap. Upper jaw anteriorly with 5-6 pairs of incisor-like teeth with rounded edges; posteriorly on each side, there are canine-like teeth with flat or slightly rounded edges; inner row with irregularly small conical teeth of variable size. Lower jaw with two rows of teeth, anterior row with 5-6 pairs of compressed, flat incisor-like teeth followed by a single series of 8 conical canine like-teeth without accessory incisor-like teeth. The second row is a patch of very small conical teeth behind the two frontal pair of incisors (Fig. 2a-b). The tongue is completely adhered to the floor of the mouth. Five shallow and small rakers on the posteriormost gill arch. Upper attachment of gill membrane opposed to the 4th pectoral fin ray. Subopercular spine weak and small, almost inperceptible. Postdorsal-caudal distance 1.8 in dorsal length. Length of disc is 2.9 in standard length. Anus is much closer to anal fin origin, and the urogenital papilla is formed as a single structure (fig. 2c).

*Coloration.*—In alcohol, the dorsal and lateral sides are evenly medium brown, with small black spots scattered on the body. The dorsal, anal and caudal fins are



Fig. 1. Holotype of Gobiesox juniperoserra lateral, dorsal and ventral view.

brown except in their bases and two caudal pale bars. Ventral surface of body is translucent; the area near the vent is almost colorless.

Habitat.—The types were collected in a small semipermanent creek called Pozas del Vado. It is located at the lower end (SW) of Sierra La Giganta, B.C.S.





В



1 mm

Fig. 2. Left dentary a) lateral and b) dorsal view. c) Urogenital papillae.



Fig. 3. Type locality of Gobiesox juniperoserra.

(Fig. 3). The average height above sea level varies from 30 to 60 m. This area is located between 24°28′ and 24°52′N and 110°49′ and 111°49′W. Climate is extreme, being the most arid of the semidry climates of the Peninsula, with a mean annual temperature ranging from 20 to 22°C, and rainy seasons, in summer and winter.

The hydrologic basin of the area is reduced to a few small natural pools (=pozas, origin of the generic name of the region). The creeks are located along two canyons that merge. Those located in the southern region merge directly or indirectly with a small river that goes to the Flor de Malva estuary, opening to the Pacific. Rivers to the north and west of the Mesa de Irai plain are joined with other small channels that occasionally reach the Punta Chale estuary opening into Bahía Almejas, at the lagoon system of Bahía Magdalena, Baja California Sur.

The Pozas del Vado are a series of ponds watered by small springs. Their diameters range from two to six meters, with a depth from 20 to 50 cm. They remain isolated during the dry season, but become interconnected at the onset of the rains and give rise to the two rivers mentioned above. This ecological setting can be compared to some biotopes located in mainland México, particularly in the states of Jalisco, Michoacán, Guerrero, and Oaxaca.

The floor of these water bodies is composed of sand, gravel, and rocks. Toward the edges of the ponds, due to accumulation and decomposition of organic matter small muddy beaches are formed. Large rounded rocks of rhyolithic material located in the rivers are common.

The aquatic vegetation collected in this locality is represented by the algae

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*Chara* sp., and the monocotyledon *Potamogeton* sp. The fresh water fauna is not diverse. To date, larvae of insects like odonates and corixids, and some amphibians, probably *Bufo marinus*, have been identified. Other organisms include freshwater shrimps (*Macrobrachium americanus, Palaemon* sp.) and fishes (*Agonostomus monticola, Gobiomorus maculatus, Awaous trasandeanus, Eleotris picta,* and the exotic *Poecilia reticulata*).

Etymology: The name *juniperoserrai* is for Fray Junípero Serra, Jesuit missionary, evangelizer, and explorer of the Alta and Baja California region during the Colonial epoch.

### Key to the Mexican freshwater species of Gobiesox

1.	Anus closer to anal fin origin than to rear margin of disc; 13 (13–14)
	rays in dorsal fin; lower jaw with two rows of incisor like teeth and with
	out accessories incisor-like teeth; tongue adhered to the floor of the
	mouth G. juniperoserrai
_	Anus midway or closer to rear margin of disc than to anal fin origin;
	tongue not adhered to the floor of the mouth
2.	Anus midway between rear margin of disc and anal fin origin; lower jaw
	with a single row of incisor-like teeth; 10 (9–10) rays in dorsal fin and 8
	(7–9) rays in anal finG. fluviatilis
_	Anus closer to rear margin of disc than to anal fin; lower jaw with several
	rows of incisor-like teeth and accessories incisor-like teeth in front row;
	12 (11–12) rays in dorsal fin and 7 (6–8) rays in anal fin $\ldots$ G. mexicanus

### Discussion

The discovery of *Gobiesox juniperoserrai* in fresh waters of the southern part of Baja California Peninsula is important from a biogeographic point of view. The closest relative of *G. juniperoserrai* based on morphological and morphometric characteristics seems to be *G. mexicanus*, distributed from Río Cuitzmala, Jalisco, south to the Tehuantepec Isthmus, Oaxaca. This distributional pattern supports the hypothesis of Castro-Aguirre and Torres-Orozco (1993), who suggested that the fish fauna of the southern part of the Sierra de la Giganta has a great affinity with the fresh water fish fauna of the southern part of Jalisco and Michoacan. Hausback (1984) has argued that this geographic area of continental Mexico corresponds geologically with the southern part of the Baja California Peninsula.

The origin of *Gobiesox juniperoserrai* could therefore be hypothesized as the result of allopatric processes began with the drifting of the Peninsula toward the northwest, perhaps during Miocene or Pliocene time. The geographic isolation of the populations, and the time elapsed may be the main factors giving rise to the new species from a relative close to *G. mexicanus*.

Besides the morphological differences between *G. fluviatilis*, *G. mexicanus*, and *G. juniperoserrai*, there are important distinctions in their habitat preferences. *Gobiesox fluviatilis* is an important component of the mountain rivers, especially those located between 750 and 1000 meters above sea level (Briggs and Miller 1960; Burr and Buth 1977).

Although the three species belong to the complementary fish component of

Myers (1951, 1963), it is evident that *G. mexicanus* may be included in the Neotropical fish fauna, whereas *G. fluviatilis* could be cataloged as a nearctic element. *Gobiesox juniperoserrai* represents, therefore, a northern species with Neotropical ancestry.

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